

FORM PTO-1390 (Modified)
(REV 11-2000)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES

216490US2PCT

DESIGNATED/ELECTED OFFICE (DO/EO/US)

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

CONCERNING A FILING UNDER 35 U.S.C. 371

09/926804

INTERNATIONAL APPLICATION NO.

PCT/JP00/02608

INTERNATIONAL FILING DATE

20 APRIL 2000

PRIORITY DATE CLAIMED

NONE

TITLE OF INVENTION

PORTABLE RADIO

APPLICANT(S) FOR DO/EO/US

Hideaki SHOJI, et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
 - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☒ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☒ is attached hereto.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☐ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☐ Certificate of Mailing by Express Mail
23. ☒ Other items or information:

Drawings (7 Sheets)

PCT/IB/308

Form PTO 1449

Statement of Relevancy

Cited References (2)

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.492 (a)(1) - (5))

097926804

INTERNATIONAL APPLICATION NO.

PCT/JP00/02608

ATTORNEY'S DOCKET NUMBER

216490US2PCT

24. The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

- ☐ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1040.00
- ☒ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00
- ☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00
- ☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00
- ☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT =

\$890.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).

\$0.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	13 - 20 =	0	x \$18.00	\$0.00	
Independent claims	1 - 3 =	0	x \$84.00	\$0.00	
Multiple Dependent Claims (check if applicable). <input type="checkbox"/>				\$0.00	
TOTAL OF ABOVE CALCULATIONS =				\$890.00	
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27). The fees indicated above are reduced by 1/2.				\$0.00	
SUBTOTAL =				\$890.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).				\$0.00	
TOTAL NATIONAL FEE =				\$890.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input checked="" type="checkbox"/>				\$40.00	
TOTAL FEES ENCLOSED =				\$930.00	
				Amount to be: refunded	\$
				charged	\$

- a. ☒ A check in the amount of \$930.00 to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees. A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 15-0030. A duplicate copy of this sheet is enclosed.
- d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Surinder Sachar
Registration No. 34,423



22850

SIGNATURE

Marvin J. Spivak

NAME

24,913

REGISTRATION NUMBER

DATE

Dec. 20 2001

SPECIFICATION

Portable Radio

5 Technical Field

The present invention relates generally to portable radio or mobile radio sets and particularly to those having a housing (hereinafter referred to as a "cover") opened and closed, as desired, and provided with an antenna.

10

Background Art

In Japanese Patent Laying-Open No. 8-186518 an example of a radio communication apparatus is disclosed having a cover opened and closed, as desired, and provided with an antenna (hereinafter referred to as a "cover antenna").

15

This cover antenna has first and second components and when the cover is opened the first component is tuned in to an operating frequency of a transmission and reception circuit and when the cover is closed the second component is tuned in to the operating frequency of the transmission and reception circuit. As such whether the cover is opened or closed the cover antenna can be tuned in to the operation frequency of the transmission and reception circuit.

20

The radio communication apparatus disclosed in the above document, however, would have a cover provided with two substantial antennas and these antennas that are coupled are a concern as antenna efficiency may be decreased. Furthermore the cover antenna as described above would require two power feed lines which are also difficult to provide as they are required to be provided at a connection (a hinge) of the cover and the housing.

25

30

Disclosure of the Invention

The present invention has been made to overcome the disadvantages as described above. An object of the present invention is to provide a

portable radio or mobile radio set having a cover opened and closed, as desired, and provided with an antenna, wherein provision of a power feed line can be facilitated while reduction of antenna efficiency can be prevented.

5 The present invention provides a portable radio including: a casing ; a cover attached to the casing and opened and closed as desired; an antenna formed by providing a notch in a conductive layer incorporated in the cover; and power supply or feeding means for exciting the antenna.

10 Since the cover can incorporate a conductive layer notched to form an antenna, as described above, even with the cover closed a wide band can be ensured for a return loss of approximately no more than - 6dB, as shown in Fig. 2. As such, whether the cover is opened or closed, a single antenna can be sufficient and it is no longer necessary to provide the cover with two antennas, as conventional. Consequently, reduction of antenna efficiency
15 can be reduced. Since a single antenna suffices a single power feeding line accordingly suffices and it can thus readily be provided.

Preferably the conductive layer is provided substantially throughout the cover and the notch starts from an end of the cover free of a connection to the casing and extends in the cover inwardly.

20 Furthermore the notch preferably extends in the direction of the length of the casing. This allows a polarized wave to be provided in a direction orthogonal to the direction of the length of the casing to produce vertical polarization in use.

25 Preferably the notch has a length corresponding to one fourth of a wavelength. Furthermore, preferably the notch as seen lengthwise has one end larger in width than the other end. A further increased band can be provided if the one end of the notch as seen lengthwise is positioned opposite a connection of the cover and the casing or corresponds to a top end of the notch (an end thereof that is opened). Furthermore, if it is
30 positioned closer to the connection of the cover and the casing or closer to a foot of the notch, the notch can be reduced in length.

The notch may at least partially be bent in geometry. This can also reduce the notch in length.

Preferably the casing is provided with a resonator excited by the antenna. The resonator may be a $\frac{1}{4}$ wavelength resonator having one end with short circuit and the other end with open circuit or a $\frac{1}{2}$ wavelength resonator having opposite ends with open circuit. Furthermore the resonator is preferably positioned to be adjacent to the antenna when the cover is closed.

The present portable radio preferably includes: first and second matching circuits; detection means detecting whether the cover is open or closed; a first switch switching according to a result obtained from the detection means, to connect the first and second matching circuits to the antenna; and a second switch switching according to a result obtained from the detection means, to connect the first and second matching circuits to the power feeding means.

Brief Description of the Drawings

Fig. 1 schematically shows a configuration of a portable radio in a first embodiment of the present invention.

Fig. 2 represents a relationship between return loss and frequency for the antenna of the Fig. 1 portable radio when the cover is closed.

Fig. 3 schematically shows a configuration of a portable radio in a second embodiment of the present invention.

Fig. 4 represents a relationship between return loss and frequency for the antenna of the Fig. 2 portable radio when the cover is closed.

Fig. 5 schematically shows a configuration of a portable radio in a third embodiment of the present invention.

Fig. 6 schematically shows a configuration of a portable radio in a fourth embodiment of the present invention.

Fig. 7 schematically shows a configuration of a variation of the Fig. 6 portable radio.

Fig. 8A schematically shows a configuration of a portable radio in a fifth embodiment of the present invention.

Fig. 8B shows the Fig. 8A portable radio with the cover closed.

Fig. 9 represents a relationship between return loss and frequency

for the antenna of the Fig. 8A portable radio when the cover is closed.

Fig. 10 schematically shows a configuration of a portable radio in a sixth embodiment of the present invention.

5 Best Mode for Carrying Out the Invention

Hereinafter the embodiments of the present invention will be described with reference to Figs. 1-10.

First Embodiment

Fig. 1 schematically shows a configuration of a portable radio or
10 mobile radio set 1, such as a mobile wireless phone, in a first embodiment of the present invention.

As shown in Fig. 1, portable radio 1 includes a casing 2, a cover or
flip 3 opened and closed, as desired, an antenna 5 and a power feed means
6.

15 Cover 3 is formed of dielectric material such as organic polymer and it internally has antenna 5. Antenna 5 is formed by providing a notch 4 in a conductive layer provided to cover 3. The conductive layer is formed for example of metal and it can for example be plated or provided through vapor deposition. In Fig. 1 the conductive layer has a U-letter, planar
20 geometry and it is provided across substantially throughout cover 3.

As shown in Fig. 1, notch 4 extends in a direction of a length of casing 2, extending in cover 3 inwardly starting from an end of cover 3 that is not connected to casing 2. Notch 4 has a length L1 preferably of one
forth of a wavelength ($\lambda/4$).

25 With reference to Fig. 2, since antenna 5 as described above is provided in cover 3, with cover 3 closed a wide bandwidth of approximately 130 MHz is provided for a return loss of no more than - 6dB. Thus, whether cover 3 is opened or closed, a single antenna 5 is sufficient and it is no longer necessary to provide the cover with two antennas, as conventional.
30 This can reduce reduction of antenna efficiency and also reduce the number of power feed lines.

Second Embodiment

Reference will now be made to Figs. 3 and 4 to describe a second

embodiment of the present invention. As shown in Fig. 3, in the second embodiment a notch 4a is different in geometry from notch 4 of the first embodiment. More specifically, notch 4a is wider at an end located opposite a connection of cover 3 and casing 2 (an end moving away from casing 2 when cover is opened). The remainder of the configuration is similar to the Fig. 1 example.

With reference to Fig. 4, notch 4a having an end increased in width results in a further increased bandwidth of approximately 150 MHz for the return loss of no more than - 6dB with cover 3 closed. Thus the present embodiment can provide a further increased bandwidth.

While in the Fig. 3 example notch 4a linearly tapers to have a gradually increasing width it may have any other forms that can permit notch 4a to be larger in width at a top than a bottom or root. Also note that notch 4a has a length L2 for example of λ divided by four.

Third Embodiment

Reference will now be made to Fig. 5 to describe a third embodiment of the present invention. With reference to Fig. 5, in the third embodiment notch 4 has a foot or short circuit 7 located closer to a connection of cover 3 and casing 2 and having a width W2 larger than a width W1 of a portion of notch 4 other than foot 7. The remainder of the configuration is similar to the Fig. 1 example.

Notch 4 has width W1 for example of approximately λ divided by 40 and width W2 preferably of approximately three times width W1 since notch 4 having foot 7 with large width W2 allows notch 4 to be reduced in a length L3 and thus antenna 5 to be compact.

While in the Fig. 5 example foot 7 is rectangular in geometry it may have any geometry selected as desired that has width W2 larger than width W1.

Fourth Embodiment

Reference will now be made to Figs. 6 and 7 to describe a fourth embodiment of the present invention and a variation thereof. As shown in Fig. 6, in the fourth embodiment a notch 4c meanders. Alternatively, as shown in Fig. 7, notch 4 may have only a foot 8 meandering. The

remainder of the configuration is similar to the Fig. 1 example.

At least partially meandering notch 4, 4c, as described above, can be reduced in lengths L4 and L5 and thus allow antenna 5 to be compact.

Fifth Embodiment

Reference will now be made to Figs. 8A and 8B and 9 to describe a fifth embodiment of the present invention.

As shown in Figs. 8A and 8B, in the fifth embodiment casing 2 is provided with a resonator 9. The remainder of the configuration is similar to the Fig. 1 example.

Resonator 9 is positioned to be adjacent to antenna when cover 3 is closed, and it is excited by antenna 5 contactless.

With reference to Fig. 9, the provision of resonator 9 results in two bands for the return loss of no more than - 6dB. Thus consequently a wide band can be achieved.

As shown in Fig. 8A, resonator 9 may have one end with short circuit and the other end with open circuit to be a $\lambda/4$ resonator (a resonator having a length L6 of λ divided by four) or it may have opposite ends with open circuit to be a $\lambda/2$ resonator.

Sixth Embodiment

Reference will now be made to Fig. 10 to describe a sixth embodiment of the present invention. As shown in Fig. 10, in the sixth embodiment portable radio 1 includes first and second matching circuits 12 and 13, means 14 for detecting whether cover 3 is open or closed, and first and second switches 10 and 11.

The first matching circuit 12 is connected to antenna 5 when cover 3 is opened. The second matching circuit 13 is connected to antenna 5 when cover 3 is closed. In parallel with the second matching circuit 13 is provided a resonance circuit (not shown).

Means 14 can for example be that as disclosed in Japanese Patent Laying-Open No. 6-291820. A result obtained from means 14 is referred to to control the first and second switches 10 and 11.

According to a result obtained from means 14 the first switch 10 switches to connect the first and second matching circuits 12 and 13 to

antenna 5, as described above. According to a result obtained from mean 14 the second switch 11 switches to connect the first and second matching circuits 12 and 13 to power feeding means 6. That is, when cover 3 is opened the first matching circuit 12 is connected to power feeding means 6 and when cover 3 is closed the second matching circuit 13 is connected to power feeding means 6.

The present invention has been described and illustrated in detail with reference to the embodiments. It may be provided in an appropriate combination of the features of the embodiments. It is clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of the present invention being limited only by the terms of the appended claims.

Industrial Applicability

The present invention is usefully applicable to portable radios with a casing provided with a cover or flip opened and closed, as desired, and provided with an antenna.

CLAIMS

1. A portable radio comprising:
a casing (2);
5 a cover (3) attached to said casing (2) and opened and closed as desired;
an antenna (5) formed by providing a notch (4) in a conductive layer incorporated in said cover (3); and
10 power supply means (6) for exciting said antenna (5).
2. The portable radio according to claim 1, wherein:
said conductive layer is provided substantially throughout said cover (3); and
15 said notch (4) extends from an end of said cover (3) free of a connection to said casing (2).
3. The portable radio according to claim 1, wherein said notch (4) extends in a length direction of said casing (2).
- 20 4. The portable radio according to claim 1, wherein said notch (4) has a length (L1) corresponding to one fourth of a wavelength.
5. The portable radio according to claim 1, wherein said notch (4) as seen lengthwise has one end larger in width than the other end.
- 25 6. The portable radio according to claim 5, wherein said notch (4) has said one end positioned opposite a connection of said cover (3) and said casing (2).
- 30 7. The portable radio according to claim 5, wherein said notch (4) has said end positioned closer to a connection of said cover (3) and said casing (2).

8. The portable radio according to claim 1, wherein said notch (4) is at least partially bent in geometry.

5 9. The portable radio according to claim 1, wherein said casing (2) is provided with a resonator (9) excited by said antenna (5).

10 10. The portable radio according to claim 9, wherein said resonator (9) includes a $\frac{1}{4}$ wavelength resonator having one end with short circuit and the other end with open circuit.

11. The portable radio according to claim 9, wherein said resonator (9) includes a $\frac{1}{2}$ wavelength resonator having opposite ends with open circuit.

15 12. The portable radio according to claim 9, wherein said resonator (9) is positioned to be adjacent to said antenna (5) when said cover (3) is closed.

20 13. The mobile radio set according to claim 1, comprising:
first and second matching circuits (12, 13);
detection means (14) detecting whether said cover (3) is open or closed;

25 a first switch (10) switching according to a result obtained from said detection means (14), to connect said first and second matching circuits (12, 13) to said antenna (5); and

a second switch (11) switching according to a result obtained from said detection means (14), to connect said first and second matching circuits (12, 13) to said power supply means (6).

FIG.1

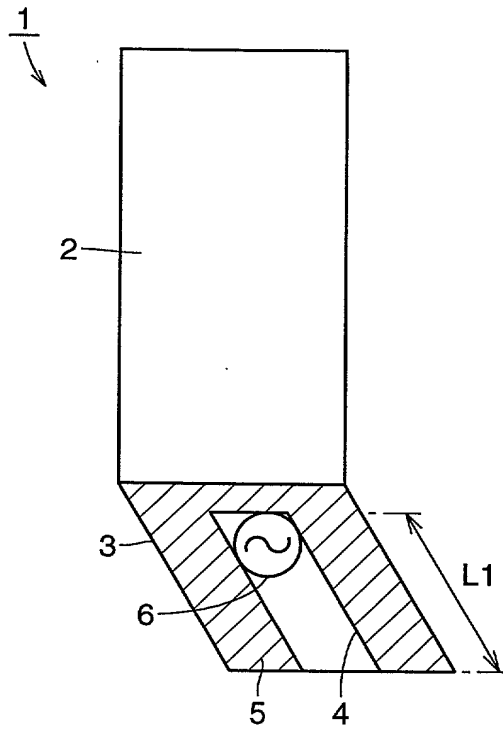


FIG.2

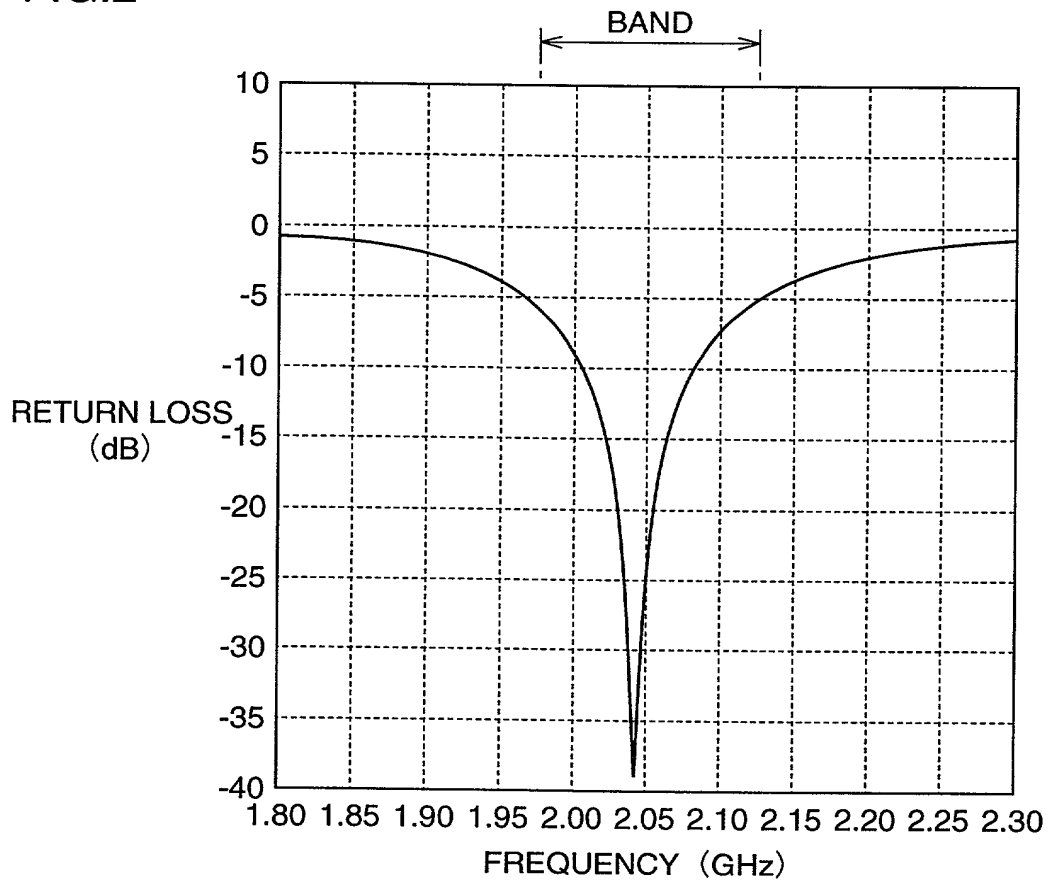


FIG.3

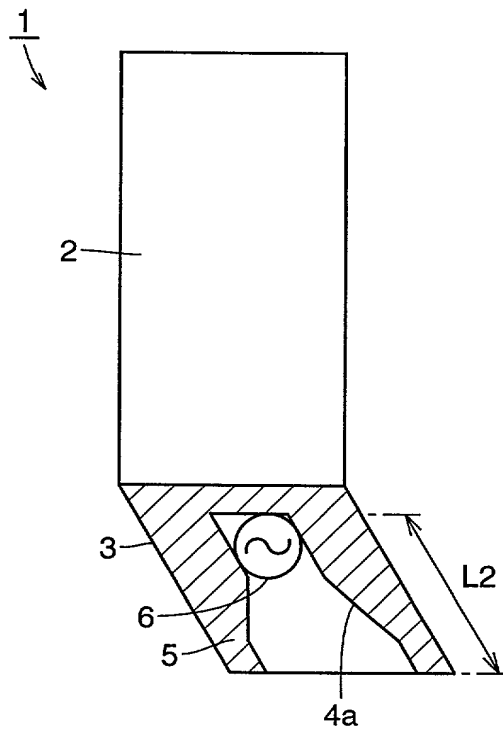


FIG.4

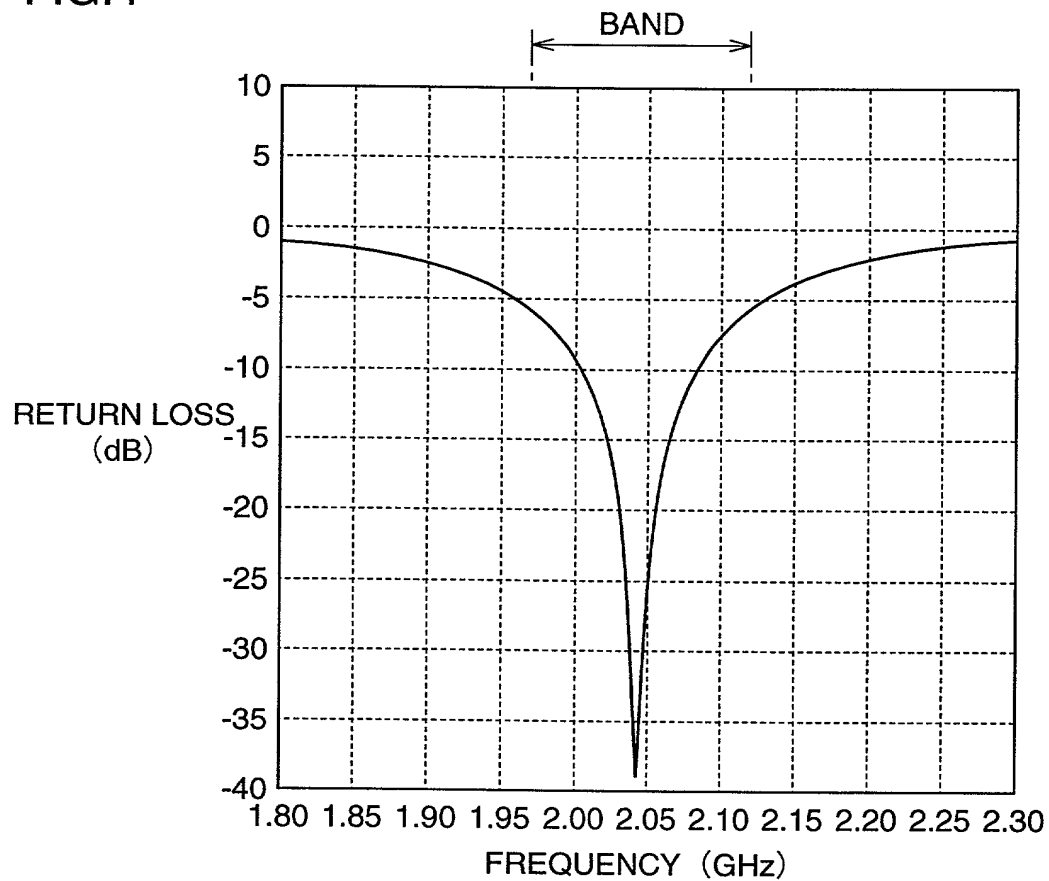


FIG. 5

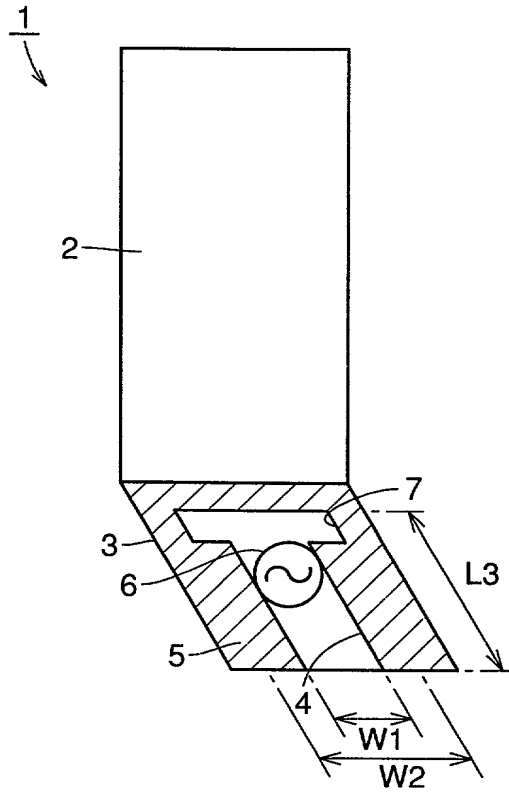


FIG. 6

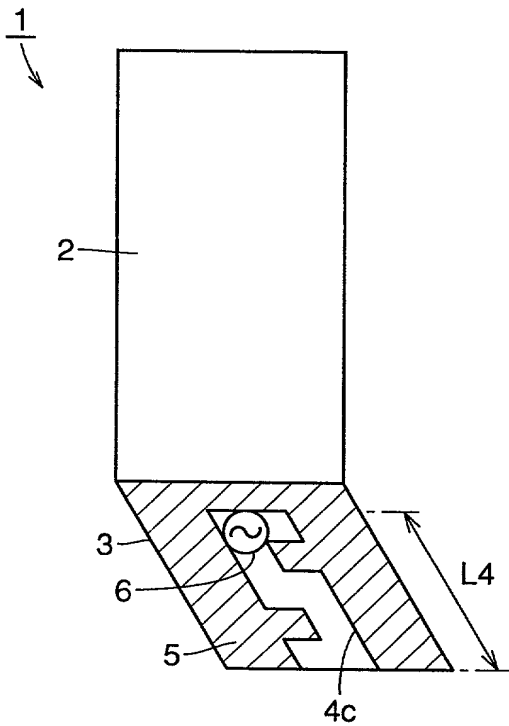


FIG. 7

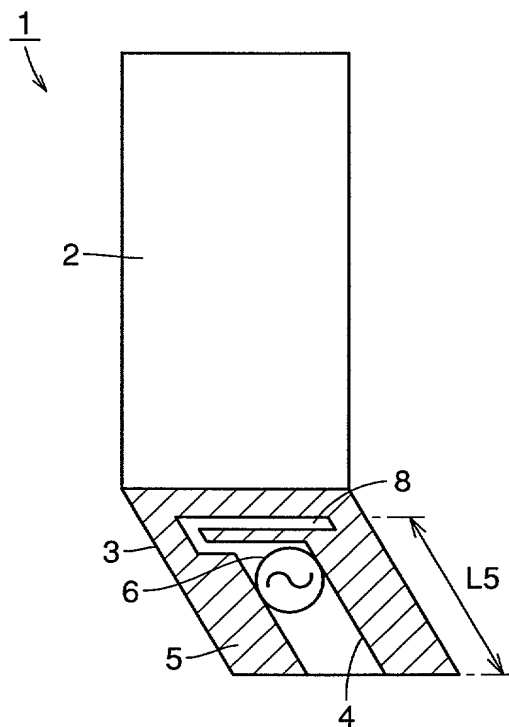


FIG. 8A

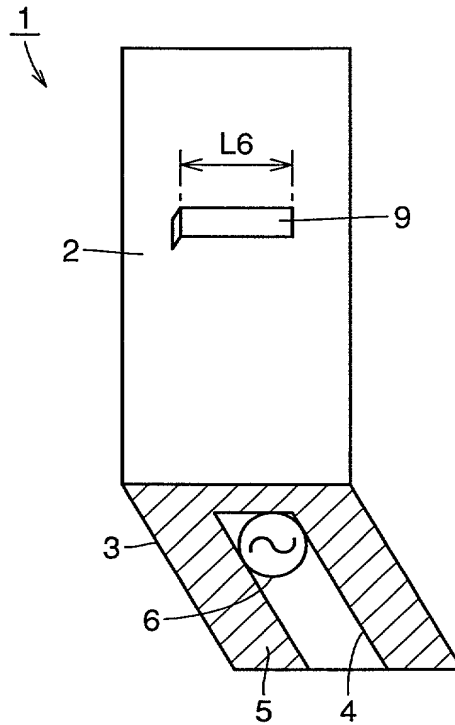


FIG. 8B

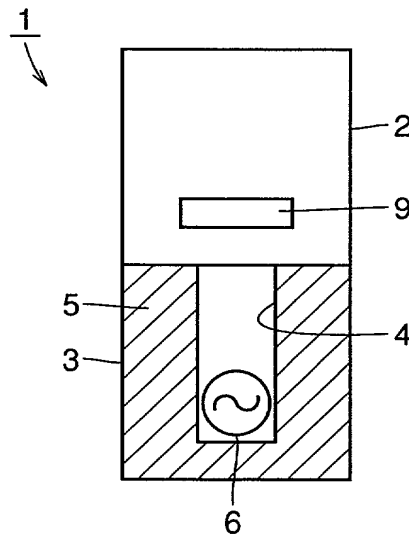


FIG.9

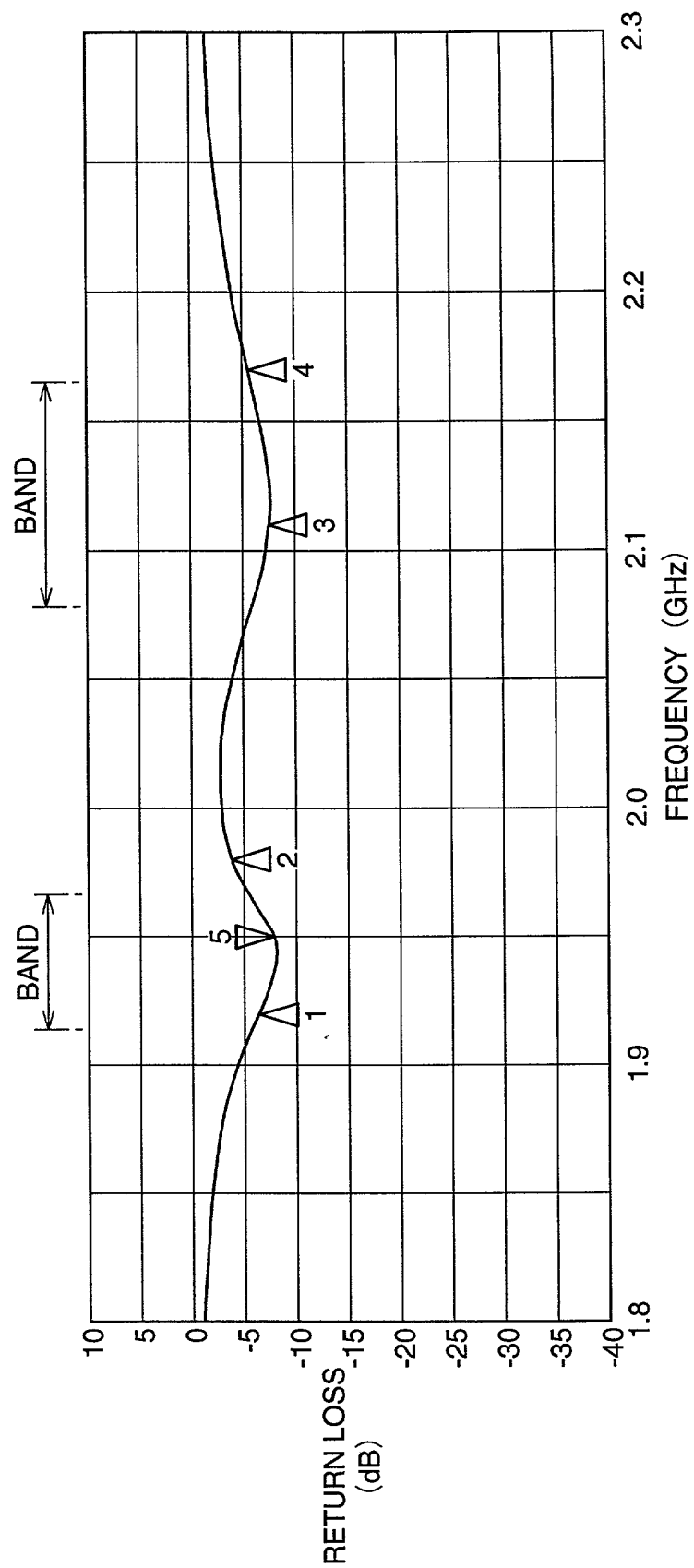
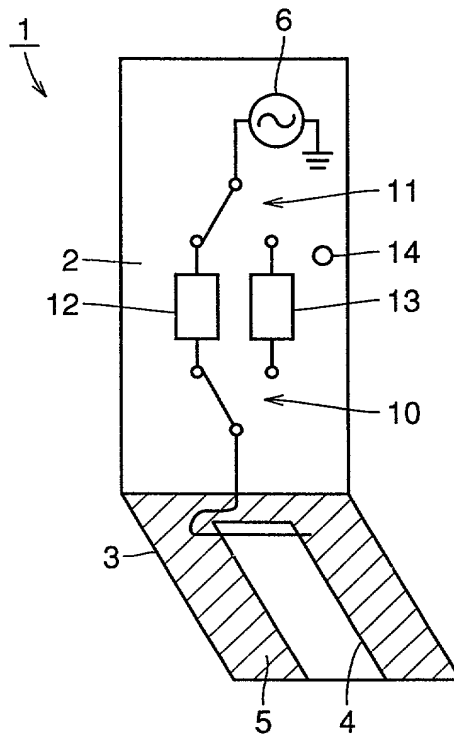


FIG. 10



Declaration and Power of Attorney For Patent Application

特許出願宣言書及び委任状

Japanese Language Declaration

日本語宣言書

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者（下記の名称が複数の場合）であると信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled.

PORTABLE RADIO

上記発明の明細書は、

the specification of which

☐ 本書に添付されています。

☒ is attached hereto.

☐ ____月____日に提出され、米国出願番号または特許協定条約国際出願番号を____とし、
(該当する場合) ____に訂正されました。

☒ was filed on April 20, 2000
as United States Application Number or
PCT International Application Number
PCT/JP00/02608 and was amended on
____ (if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第37編第1条56項に定義されるとおり、特許資格の有無について重要な情報を開示する義務があることを認めます。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

Japanese Language Declaration
(日本語宣言書)

私は、米国法典第35編119条 (a) - (d) 項又は365条 (b) 項に基づき下記の、米国以外の国の少なくとも一カ国を指定している特許協力条約365 (a) 項に基づく国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している、本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

Prior Foreign Application(s)
外国での先行出願

(Number) (番号)	(Country) (国名)
(Number) (番号)	(Country) (国名)

私は、第35編米国法典119条 (e) 項に基づいて下記の米国特許出願規定に記載された権利をここに主張いたします。

(Application No.) (出願番号)	(Filing Date) (出願日)
-----------------------------	------------------------

私は、下記の米国法典第35編120条に基づいて下記の米国特許出願に記載された権利、又は米国を指定している特許協力条約365条 (c) に基づく権利をここに主張します。また、本出願の各請求範囲の内容が米国法典第35編112条第1項又は特許協力条約で規定された方法で先行する米国特許出願に開示されていない限り、その先行米国出願書提出日以降で本出願書の日本国内または特許協力条約国際提出日までの期間中に入手された、連邦規則法典第37編1条56項で定義された特許資格の有無に関する重要な情報について開示義務があることを認識しています。

(Application No.) (出願番号)	(Filing Date) (出願日)
-----------------------------	------------------------

(Application No.) (出願番号)	(Filing Date) (出願日)
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私は、私自信の知識に基づいて本宣言書中で私が行なう表明が真実であり、かつ私の入手した情報と私の信じるところに基づく表明が全て真実であると信じていること、さらに故意になされた虚偽の表明及びそれと同等の行為は米国法典第18編第1001条に基づき、罰金または拘禁、もしくはその両方により処罰されること、そしてそのような故意による虚偽の声明を行なえば、出願した、又は既に許可された特許の有効性が失われることを認識し、よってここに上記のごとく宣誓を致します。

I hereby claim foreign priority under Title 35, United States Code, Section 119 (a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Priority Claimed
優先権主張

<input type="checkbox"/>	<input type="checkbox"/>
Yes はい	No いいえ
<input type="checkbox"/>	<input type="checkbox"/>
Yes はい	No いいえ

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

(Application No.) (出願番号)	(Filing Date) (出願日)
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I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of application.

(Status: Patented, Pending, Abandoned)
(現況: 特許許可済、係属中、放棄済)

(Status: Patented, Pending, Abandoned)
(現況: 特許許可済、係属中、放棄済)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Japanese Language Declaration
(日本語宣言書)

委任状：私は下記の発明者として、本出願に関する一切の手続きを米特許商標局に対して遂行する弁理士または代理人として、下記の者を指名いたします。
(弁護士、または代理人の指名及び登録番号を明記のこと)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (list name and registration number)



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(第三以降の共同発明者についても同様に記載し、署名すること)

(Supply similar information and signature for third and subsequent joint inventors.)

Japanese Language Declaration
(日本語宣言書)

第三の共同発明者の氏名	<u>300</u>	Full name of third joint inventor, if any <u>Toru FUKASAWA</u>
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第五の共同発明者の氏名		Full name of fifth joint inventor, if any
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郵便の宛先		Post Office Address

第六の共同発明者の氏名		Full name of sixth joint inventor, if any
第六の共同発明者の署名	日付	Sixth joint Inventor's signature Date
住所		Residence
国籍		Citizenship
郵便の宛先		Post Office Address

(第六またはそれ以降の共同発明者に対しても同様な情報および署名を提供すること。)

(Supply similar information and signature for third and subsequent joint inventors.)